

## CLAIMS

1. A probe device for measuring the concentration of at least one volatile component in an aqueous solution, in particular for measuring the concentration of ethanol, comprising:  
  
a probe body with an opening, which is tightly covered by a flat membrane, wherein said membrane is permeable for the volatile component,  
  
a sensor for measuring the concentration of the volatile component,  
  
wherein said sensor is located inside the probe body and comprises a sensitive surface, which is located in a first measuring space,  
  
wherein an inner side of the flat membrane is part of a second measuring space,  
  
wherein the first measuring space and the second measuring space are connected by a measuring aperture, and  
  
wherein the first measuring space is connected to a carrier gas exhaust and the second measuring space is connected to a carrier gas supply.
2. The probe device according to claim 1, wherein the flat membrane comprises at least two layers, wherein a first layer is a porous carrier layer and the second layer comprises a material permeable for the volatile component, wherein the first layer and the second layer are attached to each other to form a multi layer structure, wherein the first layer is the inner side of the flat membrane.
3. The probe device according to claim 2, wherein the porous carrier layer comprises porous PTFE and the material permeable for the volatile component is a silicon polymer.

4. The probe device according to claim 2 or 3, wherein the first layer has a thickness in the range from 0,2 to 3,0 mm, and wherein the second layer has a thickness in the range from 0,01 to 2,0 mm.
5. The probe device according to any of the claims 1 to 4, wherein the first measuring space has a volume in the range from 10 to 10.000 mm<sup>3</sup> and the second measuring space has a volume in the range from 10 to 10.000 mm<sup>3</sup>.
6. The probe device according to any of the claims 1 to 5, wherein the measuring aperture has an opening area in the range from 1 to 100 mm<sup>2</sup> and a length, measured in directions orthogonal to the opening area, in the range from 0,2 to 10 mm.
7. The probe device according to any of the claims 1 to 6, wherein the second measuring space consists of a pore space of a porous material, preferably of the pore space of the first layer of the flat membrane.
8. A method for operating a probe device according to any of the claims 1 to 7, wherein the flat membrane is contacted with the aqueous solution containing the volatile component, wherein the carrier gas supply is connected to a carrier gas source via means for controlling gas flow rates, wherein a defined gas flow from the carrier gas source through the carrier gas supply into the second measuring space, from the second measuring space through the measuring aperture into the first measuring space, and from the first measuring space to the carrier gas exhaust is established by operation of the means for controlling gas flow rates, wherein the gas flow rate is adjusted in the range from 5 to 100 ml/min.